

Instructions

Choosing between Models - 1

Using the particle model:

Try to use the particle model (model 1 and/or model 2) to explain what is happening in the following situations. (You do not need to discuss all of them – please ignore any that you do not feel you are able to talk about).

You may decide:

- **one of the models** is more useful in explaining the phenomenon
- **both of the models** are useful in explaining the phenomenon
- **neither of the models** is useful in explaining the phenomenon

Some phenomena:

- an ice cube melting
- starch being converted to glucose when mixed with saliva
- steam produced from boiling water
- salt dissolving in water
- a copper bar being drawn out into a wire
- a metal rod getting slightly longer when it is heated
- methane and oxygen reacting in a Bunsen flame
- putty adhering to a wall
- the pressure of a gas increasing when the gas is heated
- sugar dissolving faster in a hot cup of tea
- magnesium burning in the air to form magnesium oxide
- current passing through a copper wire
- iron on a bicycle rusting in a wet garden
- chalk reacting quicker with acid solution when the lumps are broken down into powder
- a sample of radioactive material emitting alpha radiation
- the pressure of a gas increasing when it is compressed
- a spring returning to its original length when a load is removed
- ozone in the atmosphere absorbing ultraviolet radiation
- carbon dioxide and water reacting in photosynthesis
- very hot metal glowing

Instructions

Choosing between Models - 2

Explaining the properties of an ionic substance.

See if you can explain any of these properties of sodium chloride in terms of the models for ionic bonding (model A and model B). (Do not be concerned if you cannot explain all of the properties.)

- Sodium chloride is a hard substance.
- Sodium chloride cannot easily be compressed or stretched.
- Solid sodium chloride does not conduct electricity.
- Sodium chloride has a high melting temperature (1081K).
- Molten sodium chloride conducts electricity.
- Sodium chloride is colourless.
- Sodium chloride dissolves in water.
- Sodium chloride solution conducts electricity.
- Sodium chloride forms crystals that are cubic.
- Sodium chloride tastes salty.
- Sodium chloride is brittle (e.g. snaps rather than bends).
- A precipitate of silver chloride is produced when sodium chloride solution is mixed with a solution of silver nitrate.
- Sodium chloride crystals decrepitate when heated strongly.

Instructions

Decrepitation

Observing decrepitation:

Wear safety spectacles

Carefully use a spatula to place a small sample of sodium chloride crystals in a test tube.

Carefully clamp the test-tube using a clamp stand, clamp and boss, so that

- the tube is clamp tightly (bit not over-tight) at the top
- the tube is at an approximate angle of 45°

Heat the bottom of the test tube with a 'blue' Bunsen flame.

Observe carefully (with your eyes *and* ears).

The phenomena that you may see and hear is called decrepitation.

Explaining decrepitation:

Can you suggest what could be going on during decrepitation?

Instructions

Precipitation

Observing precipitation:

Wear safety spectacles

Carefully add a spatula load of sodium chloride to a test-tube half-filled with water.

Place the test-tube in a rack.

Carefully add five drops of silver nitrate solution.

Observe what happens.

Leave the tube for 5 minutes. Observe.

The white substance that is formed, and which precipitates out from the solution, is called silver chloride. Silver chloride is a compound of silver and chlorine.

Explaining precipitation:

Can you suggest what could be going on during this experiment?